定在照明のシフトを利用した超解像半導体欠陥検査
Super-resolution Optical Inspection for Semiconductor Defect by using Standing Wave Illumination Shift

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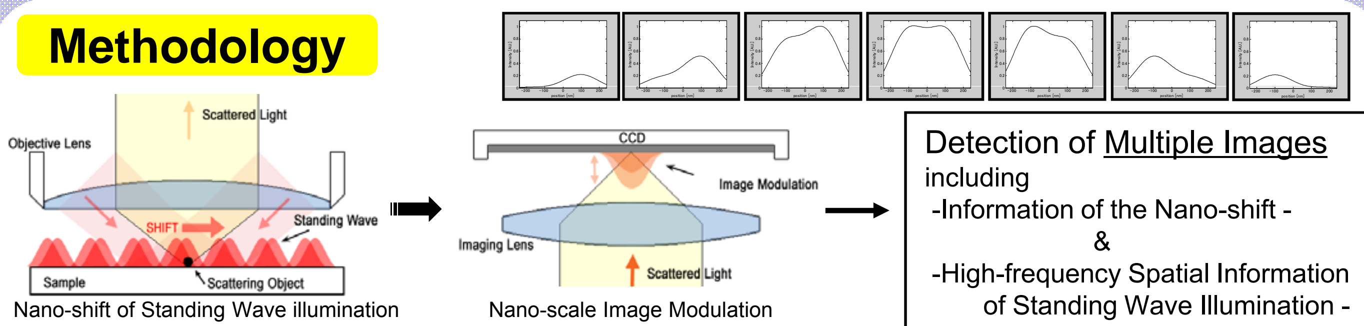
Objective

レイリー限界（回折限界）を超えた超解像光学計測手法により半導体欠陥検査手法を開発する.

- 高分解能 100nm 以下
- 欠陥検査のための高感度
- 高スループット
- 非破壊検査

Methodology

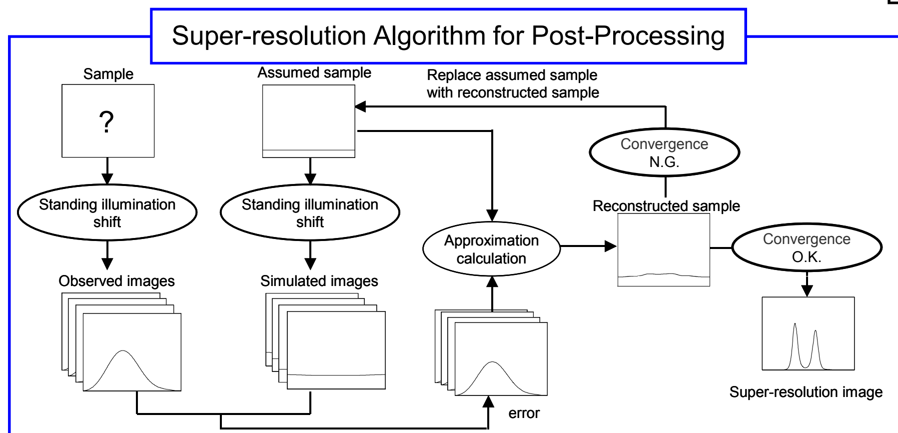


Nano-shift of Standing Wave illumination

Nano-scale Image Modulation

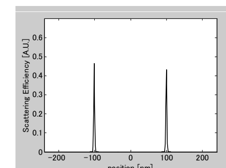
Detection of Multiple Images including
-Information of the Nano-shift -
&
-High-frequency Spatial Information of Standing Wave Illumination -

Super-resolution Algorithm for Post-Processing

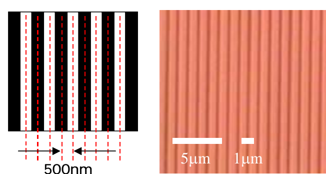


Post-processing

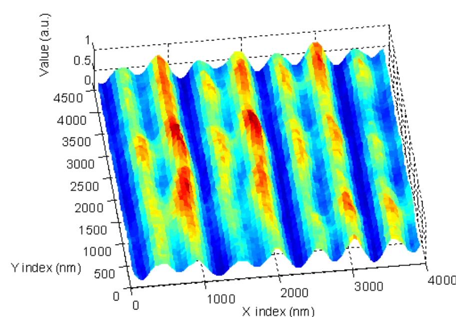
Super-resolution



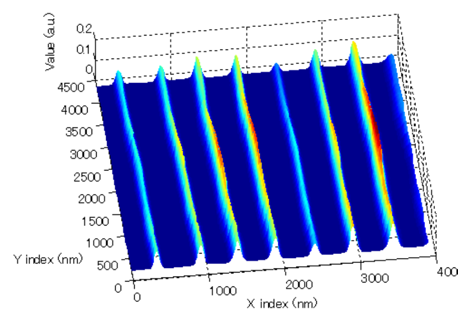
Experiment to resolve Line & Space and Defect Detection



Line & Space Pattern Sample



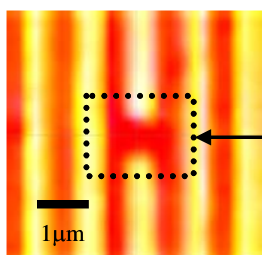
Conventional Scattered light image with NA(0.95)



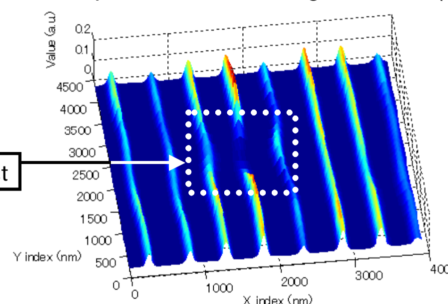
Super-resolution image with NA(0.46)

500nm-spaced periodic edge patterns were clearly resolved beyond the Rayleigh limit (647nm).

500nm-sized defect on the line and space was detected.



Defect



Ref.) S.Usuki, et. al.,Development of super-resolution optical inspection system for semiconductor defects using standing wave illumination shift, Proceedings of SPIE, Vol. 6375, 2006